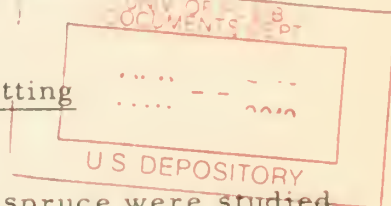


## 1766-10 VENEER CUTTING AND DRYING PROPERTIES

### ENGELMANN SPRUCE

Engelmann spruce (Picea engelmanni) grows at high elevations in the mountain ranges of the western United States and Canada.<sup>1</sup> Its wood is soft and light in weight, closely resembling the wood of the eastern spruces in appearance and properties. The heartwood is nearly white. The sapwood is narrow and only slightly lighter in color than the heartwood. The wood has a fine texture; the growth rings are fairly distinct. It is straight-grained and has moderately low shrinkage. The wood is likely to contain many small sound knots because of the many small, persistent limbs.

#### Selection and Preparation of Logs for Cutting



The veneer cutting and drying properties of Engelmann spruce were studied by the Forest Products Laboratory and the Northern Rocky Mountain Forest and Range Experiment Station.<sup>2</sup> Logs for the tests were selected on the St. Joe National Forest, in the vicinity of Roundtop, about 15 miles south of Avery, Idaho. They came from a well stocked stand of virgin white pine and spruce, with a scattering of white fir, Douglas-fir, and larch. The trees in this area were generally from 250 to 300 years old and 25 to 30 inches in diameter at breast height. The selected logs represented the best available, of a type that would be considered for veneer cutting. The average clear length available from each tree generally did not exceed one 16-foot log. The field data are summarized in table 1.

The logs were cut to 8-foot bolts, all but two of which were cut into veneer in a commercial plant. Two 8-foot bolts (from trees 13 and 14) were processed at the Forest Products Laboratory in 4-foot lengths. Some of the commercially cut bolts were heated in water at 160° F. or at 140° F. for 60 hours. Others were cut without heat treatment. Of the four bolts cut at the Laboratory, two were cut without heat treatment, one was heated for 48 hours in water at 120° F., and one was heated for a similar period at 170° F. Heating in water was effective in loosening the bark sufficiently so that it could be

<sup>1</sup>--Betts, H. S. Engelmann Spruce. Amer. Woods Ser. Forest Serv., U. S. Dept. Agr. 1945.

<sup>2</sup>--The Underwood Veneer Co., Wausau, Wis., cooperated in this study.

removed readily with hand tools. However, such heating was found to be unnecessary for purposes of good cutting, and even knotty material could be cut, unheated, without damage to the lathe knife.

### Veneer Cutting

Most of the wood was cut satisfactorily on the rotary lathe. Some sapwood veneer of the heated bolts was fuzzy because of overheating. The smoothest veneer was cut from unheated bolts, and with the proper lathe adjustment this veneer was also relatively free from severe lathe checks. Most of the veneer cut commercially was 1/16 inch thick, but a small quantity was 1/6 inch thick. At the Laboratory 1/16- and 1/8-inch veneer was cut. The lathe settings<sup>3</sup> used to cut this veneer are given in table 2.

### Veneer Drying

Most of the veneer was dried flat and free of splits in mechanical driers of the roller-conveyor type. A small amount of light compression-wood was observed in some of the wood, and veneer containing this material split and buckled in drying. The average moisture content of the heartwood was 37 percent before drying, and that of the sapwood was 140 percent. The wood was dried to an average moisture content of 2 to 5 percent. The width-wise shrinkage during drying was about 7 percent. The drying schedules used are given in table 3.

### Veneer Quality and Yields

Only a very small volume of clear veneer was produced from the spruce logs. In practically every bolt knots were encountered within the first few revolutions on the lathe, regardless of how smooth the logs were on the outside. The knots were small, averaging less than 1 inch in diameter. However, they appeared to be too numerous for patching and many of them fell out during drying, particularly in the 1/16-inch veneer. In sliced veneer, it is reported, only very few knots fall out during drying.

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<sup>3</sup>Fleischer, H O. Experiments in Rotary Veneer Cutting. Proceedings, Forest Prod. Res. Soc. 1949.

The average diameter inside bark of the logs cut was 22 inches. The commercially cut logs, in 8-foot lengths, were peeled to a diameter of about 7 inches. From a total log scale of 3,700 board feet, a gross volume of 4,958 board feet of green veneer was cut. The net volume of green veneer after clipping was 2,850 board feet. The large reduction was due to the removal of areas containing excessively large numbers of knots. Only 200 board feet, or about 7 percent of the veneer, was free of knots and considered suitable for clear face or crossband veneer.

The wood of Engelmann spruce, like that of the other spruces, is considered easy to glue, that is, satisfactory bonds can be produced over a comparatively wide range of gluing conditions and no unusual precautions in controlling gluing operations are needed. Gluing techniques that are satisfactory for such species as white fir, western hemlock, and eastern white pine are considered satisfactory for Engelmann spruce. No gluing difficulties were encountered in making a small number of sample plywood panels from the veneer that was cut experimentally.

Potential users of Engelmann spruce, who examined the clear veneer as a possible substitute for basswood as a crossband material, considered it unsuitable for this purpose because it contained too pronounced a grain pattern. In competition with other softwood species that are currently being used for crossbands, however, the material, if clear, should qualify for this purpose.

The bulk of the veneer, containing many small knots, would probably be useful mainly for the production of plywood for sheathing and container uses. It is thought to be particularly adaptable for some types of containers because of its light weight, its fine light color, and its freedom from odor and taste.

#### Commercial Experience<sup>4</sup>

Some Engelmann spruce veneer is being sliced on a commercial scale to provide faces for a decorative type of knotty paneling. Cants are selected at the saw, having a good scattering of small red knots. They are steamed for 48 hours in kilns at 140° F.

The veneer is sliced 1/12 inch thick. It is reported that some difficulty occurs in cutting because of slivers that tear from the flitch at the end of each stroke.

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<sup>4</sup>—Information supplied by Potlatch Forests, Inc., Lewiston, Idaho.

It is reported that the veneer is readily dried without defects and presents no gluing problems. It is, however, more difficult to edge joint than is pine, and some splitting and checking may be evident around knots. A good yield of knotty face grade of veneer is obtained. Veneer not suitable for faces is used in a utility back grade.



Table 1 -- Field data on material selected for test

Tree No.	Diameter: at breast height	Total height	Age: at stump	Log No. <sup>1</sup>	Length	Diameter: inside bark	Net scale: (Scribner Dec C)	Visible defects in bark
	Inches	Feet	Years		Feet	Inches	Board feet	
13	32	156	300+	13-1	16	24	400	Clear
				13-2	16	23	380	Clear
				13-3	16	22	330	3 knots
							1,110	
14	27	128	305	14-1	16	23	380	Clear
				14-2	16	21	300	Clear
							680	
15	31	125	260	15-1	16	22	360	Clear
				15-2	16	21	300	Small knot near top
							660	
16	31	135	240	16-1	16	23	380	Clear
				16-2	16	21	300	Clear
				16-3	16	19	240	3 knots
							920	
17	28	123	276	17-1	16	22	330	Clear
				17-2	16	20	280	Clear
							610	

<sup>1</sup>Log No. 1 was the first log above the stump.

Table 2. -- Lathe settings used to cut Engelmann spruce veneer

Veneer thickness	:	Knife angle	:	Nosebar openings	
				Vertical	Horizontal
<u>Inch</u>	:	<u>Degrees-Minutes</u>	:	<u>Inch</u>	<u>Inch</u>
1/16	:	90 - 00	:	0.016	0.050
1/8	:	89 - 30	:	.026	.105

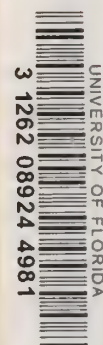


Table 3. -- Drying schedule used for Engelmann spruce veneer

Type of drying	:	Type of wood	:	Thickness	:	Temperature in dryer	:	Time in dryer
	:		:	<u>Inch</u>	:	<u>°F.</u>	:	<u>Minutes</u>
Laboratory:	:	Heart	:	1/16	:	250	:	8 - 10
Do.....do.....	:		:	1/16	:	325	:	5 - 8
Do.....do.....	:		:	1/8	:	250	:	13 - 15
Do.....do.....	:		:	1/8	:	325	:	10 - 12
Commer-	:	Heart and	:	1/16	:	250	:	19
cial	:	sap	:		:		:	
Do.....do.....	:		:	1/6	:	270	:	41